PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 48487-PT	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/CA 03/01624	International filing date *(day/month/year)* 24.10.2003	Priority date *(day/month/year)* 25.10.2002
International Patent Classification (IPC) or both national classification and IPC C22C1/10		
Applicant ALCAN INTERNATIONAL LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
11.05.2004	26.10.2004
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Brown, A. Telephone No. +49 89 2399-2563

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/CA 03/01624

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-19 as originally filed

Claims, Numbers

1-33 filed with telefax on 09.09.2004

Drawings, Sheets

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-17,19-23
	No:	Claims	18,24-33
Inventive step (IS)	Yes:	Claims	1-17,19-23
	No:	Claims	18,24-33
Industrial applicability (IA)	Yes:	Claims	1-33
	No:	Claims	

2. Citations and explanations

see separate sheet

1. The Prior Art

D1: LUCAS, STEPHENS, GREULICH: "The Effect of Reinforcement Stability on Composition Redistribution in Cast Aluminium Metal Matrix Composites" MATERIALS SCIENCE AND ENGINEERING, no. A131, 1991, pages 221-230, XP002270490 USA

2. Article 19 PCT

Claim 28 suggests that a cast composite having 10-25% vol B_4C particles that contains at least 0.2% Mg will exhibit substantially no aluminium carbide particles at the surfaces of the refractory particles (B_4C). This is however not supported by the description which states on page 19 that (referring to example 5) that figure 3 which represents the composite material with no Ti added shows substantial attack on the B4C and reacted aluminium carbide crystals are evident. Figure 4 however, which represents the composite material with 1%Ti, shows less attack on the particles. Thus it is concluded that Ti must be present in order to prevent attack of the particles and hence the formation of aluminium carbide.

2. Claims 1-23 - A Method of Manufacture

None of the prior art discloses a method of manufacture that contains all of the features as given in claim 1. Accordingly, the subject matter of claim 1 and the dependent claims 2-17 and 19-23 are novel.

D1 concerns B_4C reinforced Al alloys and describes a method of manufacture that consists of :

i. A method of preparing a cast A356 alloy Al matrix composite consisting of:
- melting of the A356 Al matrix alloy which has a composition 7% Si, 0.35% Mg, 0.2% Ti, balance Al.
- adding 25% vol% B4C particles to a melt of said alloy

- mechanically stirring mixture to promote wetting
- stir casting

ii. A final product which is the said alloy reinforced with 25% vol B_4C particles in the form of bars. (See p. 222-223 and tables 1 and 2)

The difference between the method described in claim 1 with that disclosed in D1 is that the Mg content of the alloy is kept at below 0.2% at least until the said volume fraction of B_4C composite particles are distributed throughout the volume of the melt. The effect of this process step is to ensure that sufficient fluidity is maintained for casting.

Starting from D1, none of the available prior art indicates that the fluidity of the molten composite mixture of D1 could be improved by maintaining a low Mg level until after the B_4C particles are evenly distributed within the molten alloy. Accordingly, the subject matter of claim 1 and the dependent claims 2-17 and 19-23 are inventive.

Claim 18 is written as an independent claim for a method whereby the fluidity is maintained by addition of 0.2-5% wt. of Ti. D1 discloses all the features of claim 18 and therefore the subject matter of claim 18 lacks novelty (Article 33(2)PCT).

2.1 Claims 24-33 - A Cast Composite

D1 discloses a cast composite product that consists of an Al 356 matrix having the composition 7.0% Si, 0.35% Mg, 0.2%Ti, 0.15% Fe and the balance Al, which contains 25% vol of B_4C particles. Additionally it is disclosed that the Ti forms stable compounds, namely Ti boride compounds around the surface of the B_4C particles.

Accordingly, the subject matter of claims 24,26-27,29-33 lack novelty with respect to D1.

The subject matter of claim 25 would not appear to contain anything that could be considered new and inventive as the invention relates to the control of the Mg content during processing and to the Ti content of the melt.